TARDEC'S VICTORY SIL is a Key Tool for Advancing Standardized Ground Vehicle Electronic Architecture

6 August 2012

GVSETS

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
02 AUG 2012	**Briefing**	**01-07-2012 to 01-08-2012**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
TARDEC's VICTORY SIL is a Key Tool for Advancing Standardized Gound Vehicle Electronic Architecture	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
Nikia Williams	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
U.S. Army TARDEC,6501 East Eleven Mile Rd,Warren,Mi,48397-5000	**#23227**
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
U.S. Army TARDEC, 6501 East Eleven Mile Rd, Warren, Mi, 48397-5000	**TARDEC**
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)
	#23227

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

Submitted to 2012 NDIA Ground Vehicle Systems Engineering and Technology Symposium August 14-16 Troy, Michigan

14. ABSTRACT

VICTORY SIL is a Tool for Advancing Standardized Ground Vehicle Electronic Architecture -Build In-house Environment and Knowledge Base to Support Future R&D Capability Regarding Vehicle Electronics and Architecture -Capability to Test and Verify Vendor Components and Subsystems -Advance SWaP-C with Porting and Testing VICTORY Implementations to Small, Open and Powerful Process Modules

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Public Release**	**14**	

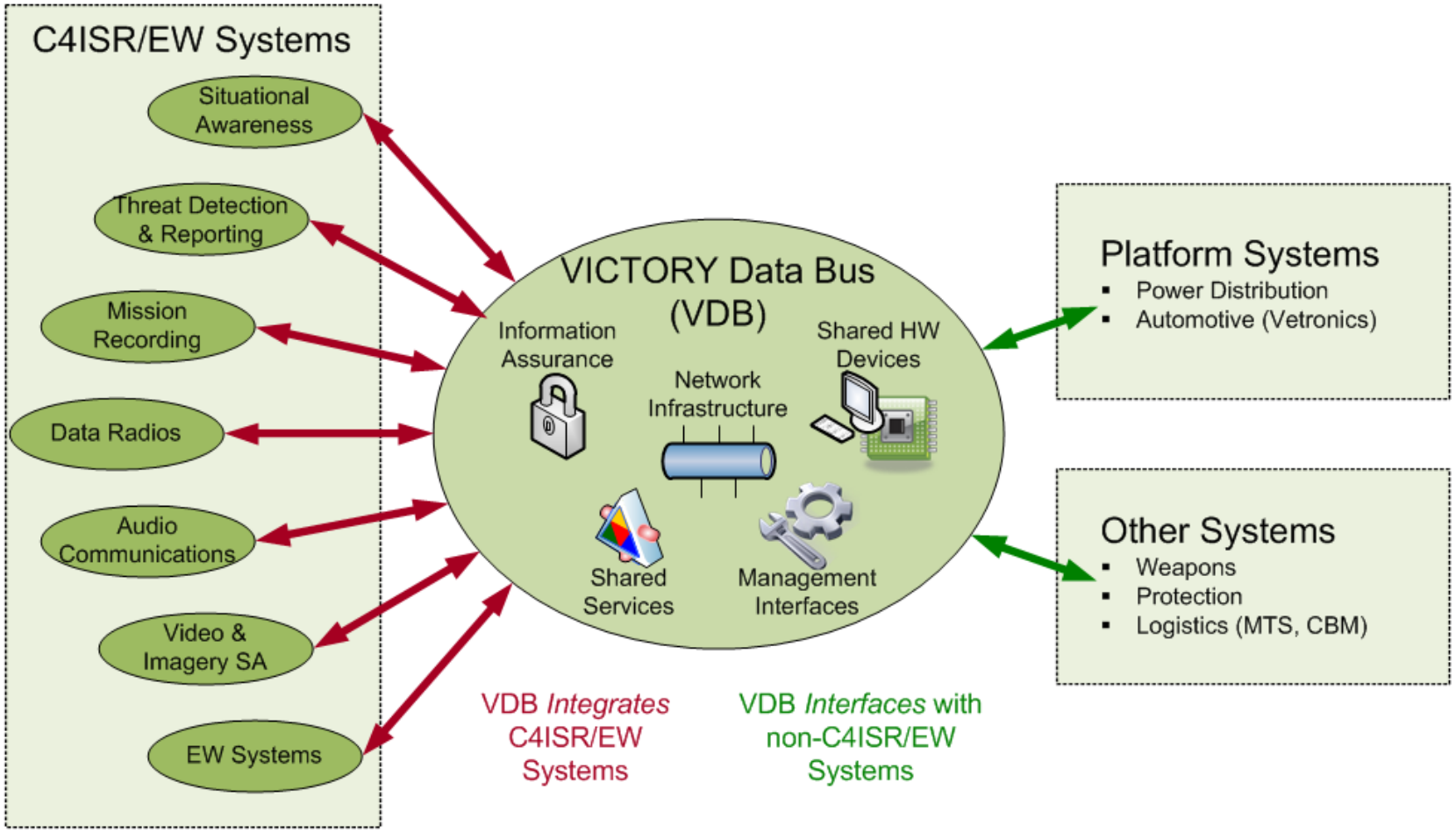
Agenda

- VICTORY SIL Background
- Timing Plan
- Development Process
- Testing Scheme and Process
- Test Results
- Interoperability
- Small SWaP
- Summary

VICTORY SIL is a Tool for Advancing Standardized Ground Vehicle Electronic Architecture

- Build In-house Environment and Knowledge Base to Support Future R&D Capability Regarding Vehicle Electronics and Architecture
- Capability to Test and Verify Vendor Components and Subsystems
- Advance SWaP-C with Porting and Testing VICTORY Implementations to Small, Open and Powerful Process Modules

VICTORY Architecture Concept



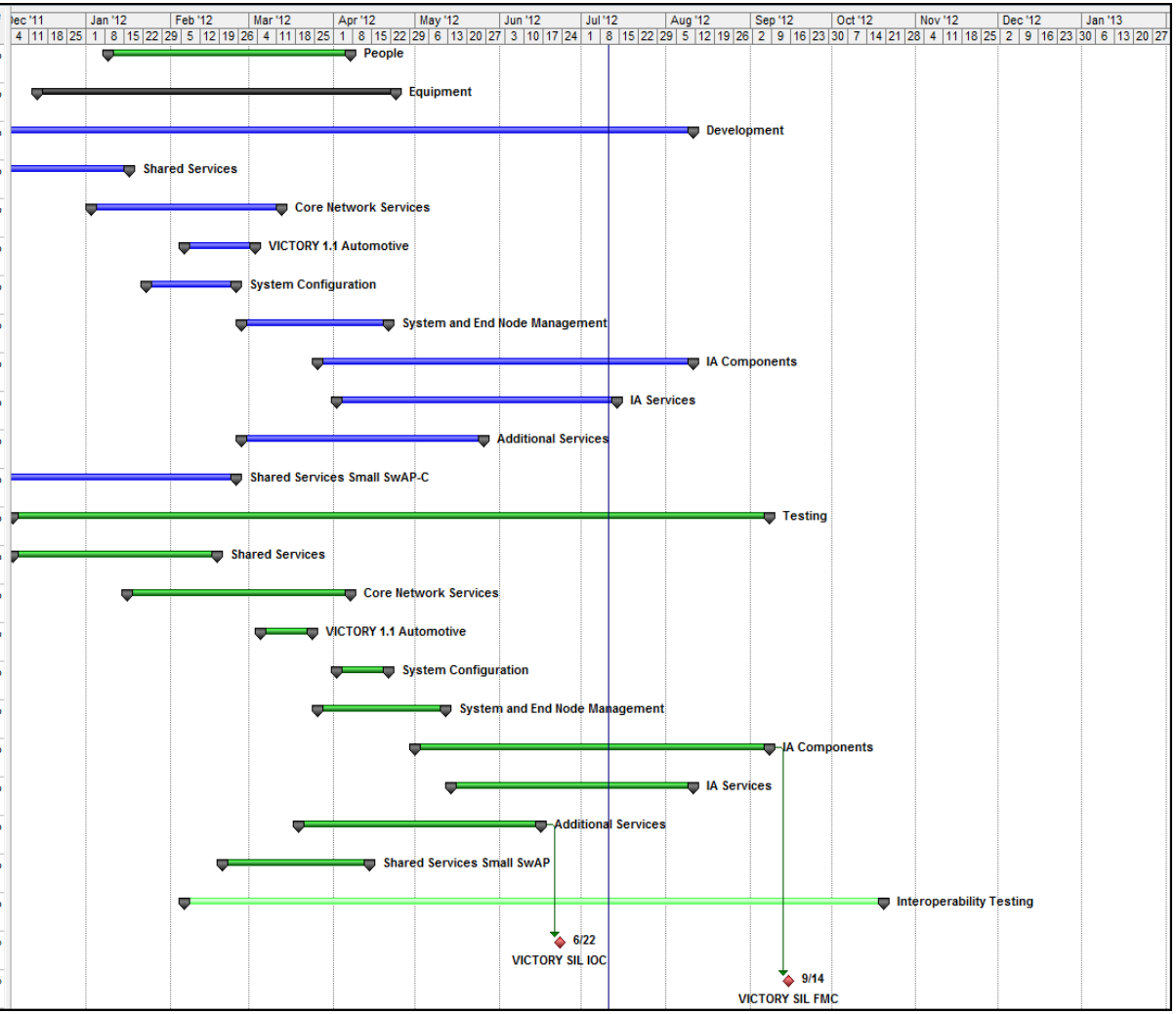
TARDEC VICTORY SIL

- Provide an independent implementation of the VICTORY 1.0 Proposed Standards
- Provide Validation and Verification of the VICTORY 1.0 Proposed Standards
- Advance VICTORY Standards from “Proposed” to “Draft”
- Identify and clarify issues with the VICTORY 1.0 Proposed Standards
- The SIL will continue to evolve and change over time as new VICTORY Standards are released (1.1, 1.2, 1.3, 1.4, 2.0, …)
- Utilize a representative vehicle cabin to demonstrate the VICTORY 1.0 Standards in a system level vehicle environment

Provide Independent Verification of vendors components to VICTORY Standard via Test Service Agreements

Detailed Milestone Schedule

	Task Name	Duration	Start	Finish	% Complete
1	People	65 days	Mon 1/9/12	Fri 4/6/12	76%
11	Equipment	94 days?	Wed 12/14/11	Mon 4/23/12	60%
43	Development	290 days?	Mon 7/4/11	Fri 8/10/12	79%
44	Shared Services	141 days?	Mon 7/4/11	Mon 1/16/12	100%
47	Core Network Services	50 days	Tue 1/3/12	Mon 3/12/12	100%
52	VICTORY 1.1 Automotive	20 days	Mon 2/6/12	Fri 3/2/12	100%
54	System Configuration	25 days	Mon 1/23/12	Fri 2/24/12	100%
56	System and End Node Management	40 days	Mon 2/27/12	Fri 4/20/12	100%
62	IA Components	100 days	Mon 3/26/12	Fri 8/10/12	6%
67	IA Services	75 days	Mon 4/2/12	Fri 7/13/12	100%
72	Additional Services	65 days	Mon 2/27/12	Fri 5/25/12	100%
77	Shared Services Small SwAP-C	105 days?	Mon 10/3/11	Fri 2/24/12	75%
80	Testing	200 days	Mon 12/5/11	Fri 9/7/12	51%
81	Shared Services	55 days	Mon 12/5/11	Fri 2/17/12	100%
88	Core Network Services	60 days	Mon 1/16/12	Fri 4/6/12	68%
92	VICTORY 1.1 Automotive	15 days	Mon 3/5/12	Fri 3/23/12	0%
94	System Configuration	15 days	Mon 4/2/12	Fri 4/20/12	0%
96	System and End Node Management	35 days	Mon 3/26/12	Fri 5/11/12	75%
104	IA Components	94 days	Tue 5/1/12	Fri 9/7/12	0%
109	IA Services	65 days	Mon 5/14/12	Fri 8/10/12	0%
114	Additional Services	65 days	Mon 3/19/12	Fri 6/15/12	61%
119	Shared Services Small SwAP	40 days	Mon 2/20/12	Fri 4/13/12	50%
122	Interoperability Testing	185 days	Mon 2/6/12	Fri 10/19/12	11%
137	VICTORY SIL IOC	0 days	Fri 6/22/12	Fri 6/22/12	100%
138	VICTORY SIL FMC	0 days	Fri 9/14/12	Fri 9/14/12	0%



Phased Development Based on VICTORY 1.0 Standard Specification

- Phase 1: Core Services (Time Synchronization, Position, Direction of Travel, Orientation), Threat Detection and Reporting, Remote Weapons Station
- Phase 2: VICTORY Data Bus (VDB) Data Transport Interfaces, Management Interfaces, Component Interfaces, C4ISR System Interfaces, VICTORY Configuration Language, and Automotive Services
- Phase 3: Security and Information Awareness Build Up and Validation

VICTORY 1.0 SIL: End State Architecture

VEHICLE ELECTRONICS AND ARCHITECTURE

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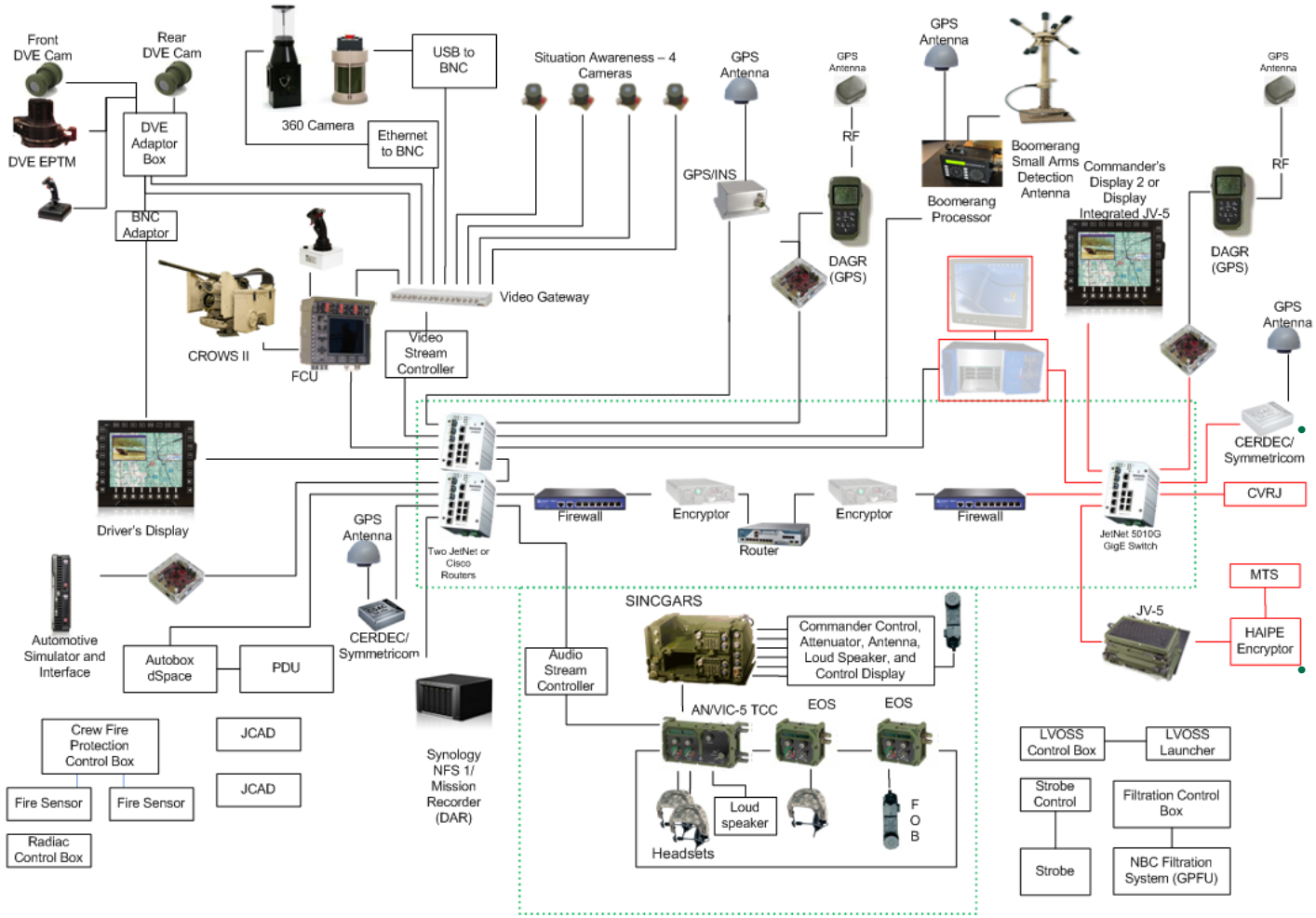


- **Shared Services**
  - √ Time
  - √ Orientation
  - √ Direction of Travel
  - √ Position
  - √ Threat
  - √ RWS
- **Networking**
  - √ IPv4 and IPv6
  - √ Multicast
  - √ SOAP
  - √ Auto-Discovery
  - √ SNMP
- **Information Assurance**
  - √ Access Control CDS
  - – Inline Network Encryptors
  - – Firewalls
  - – Intrusion Detection Systems
- **Voice and Video**
  - √ Voice Communication Interfaces
  - √ Radio Management
  - √ Video Enhanced Situational Awareness (VESA)
  - √ Streaming Video
  - √ Camera Management
- **Automotive Services**

Elements of testing at the SIL

- Specification 1.0 Verification - Message content & Format
- Functional Testing - VICTORY Service Functional Performance
- Management Interface Testing
- VICTORY Service(s) Resource Usage Testing

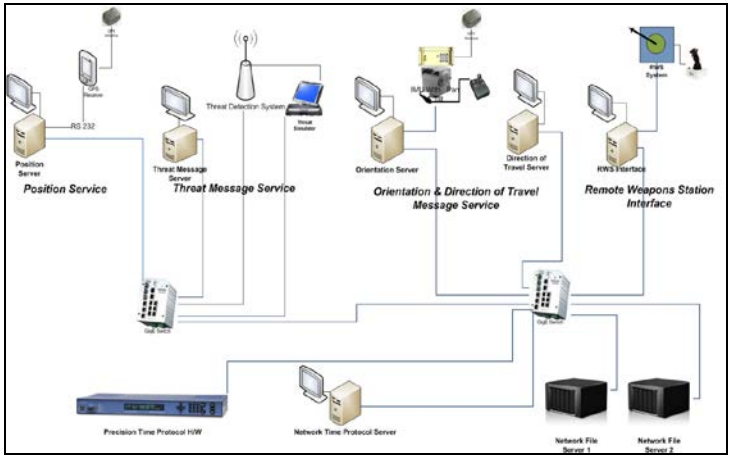
Test Plan Development

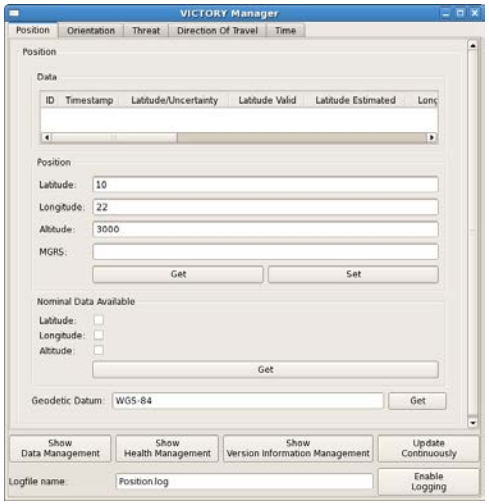
- Review of the documentation provided for the VICTORY standard specifications.
- Develop experimental procedures for validating the documented specifications. The procedures target each specification being evaluated.
- Create a logical and physical design for executing the experiment. Design the hardware and software configurations necessary to perform the experiment.

Test Results in VICTORY SIL

Elements of testing at the SIL

- SIL network built for testing
- Tools Developed to execute the test plan
- Management Interface Testing showed predictable results
- VICTORY Service(s) Resource Usage Testing was well within the limits of network capability.

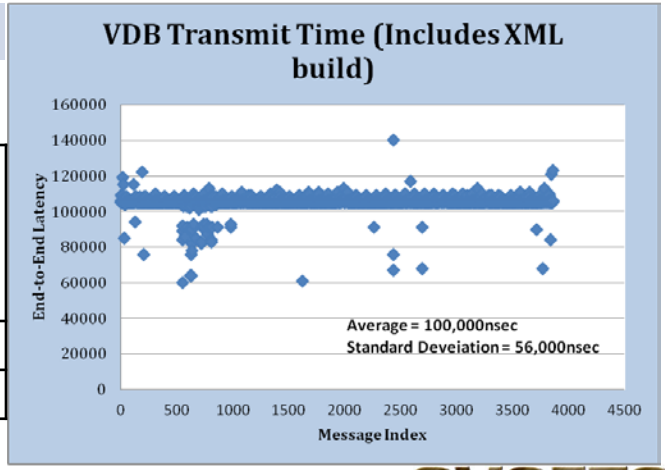




Static parameters	Values received by client	Values stored in the 'Static Configuration Settings' file
Interface ID	N/A	N/A
Source ID list	N/A	N/A
Interface type	Position	Position
Interface standard version	1.0	1.0
Configuration Version	TARDEC_VEA_VIDS_1.0	TARDEC_VEA_VIDS_1.0
Geodetic datum	N/A	N/A
Timestamp uncertainty	0	0
Minimum update period	0	0
Nominal data available	0, 0, 0	0, 0, 0

Update Period Setting	Average value update for VDM message from Wireshark
1 sec	1.000837923 sec

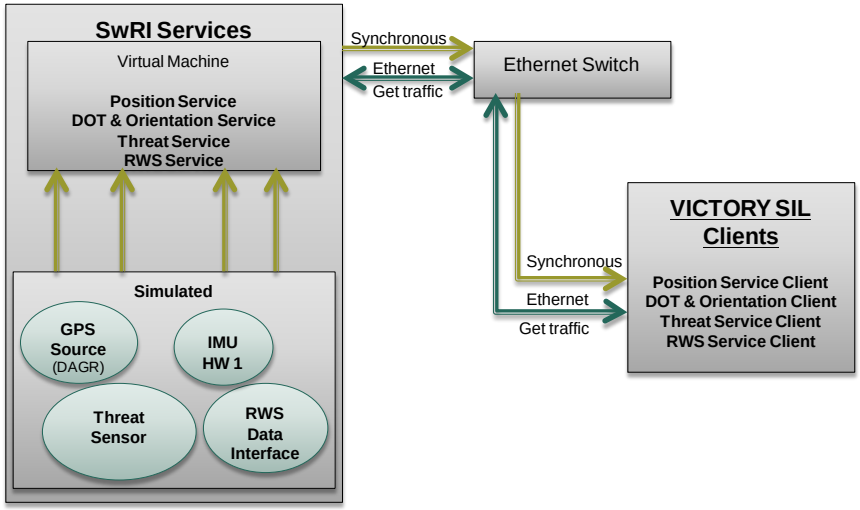
Specification Version	Number of Proposed Specifications Tested and Verified	Number of Proposed Specifications
1.0	45	96
TOTAL	45	96

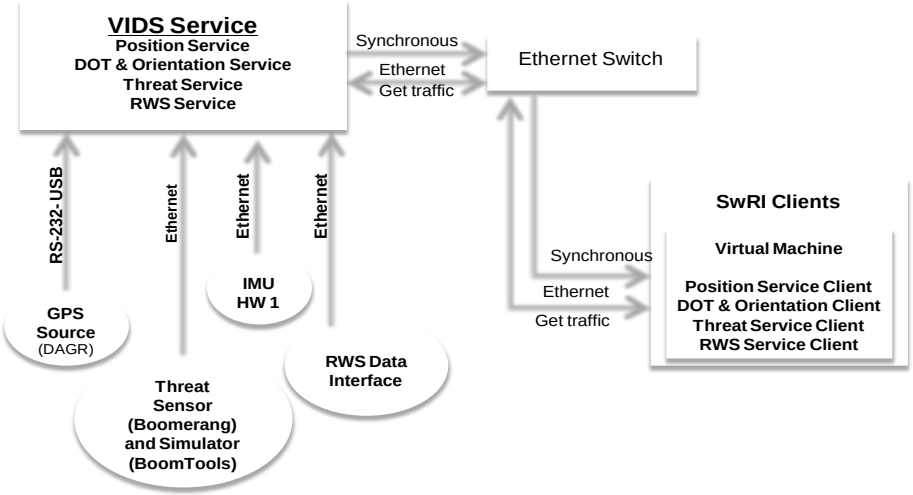


Interoperability with Independent VICTORY Implementations

Interoperability Testing

- **TARDEC's Implementation of VICTORY services and clients executed interoperated successfully with the SwRI's implementation.**
- **Future testing will include testing of this service with the network fully implemented and with many end user application implemented on the network.**

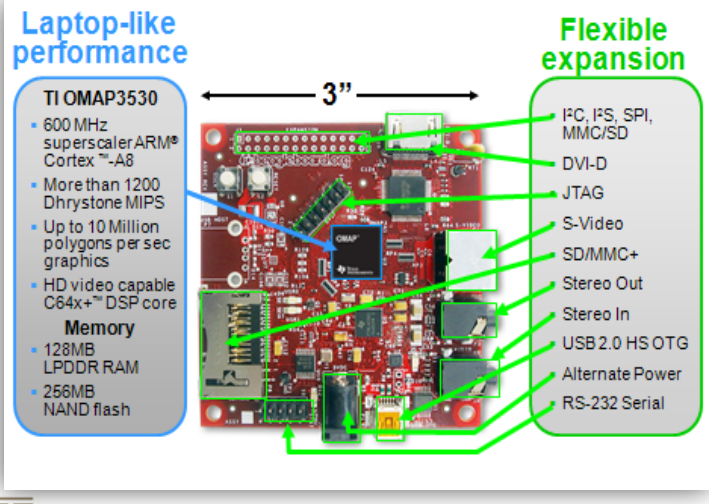


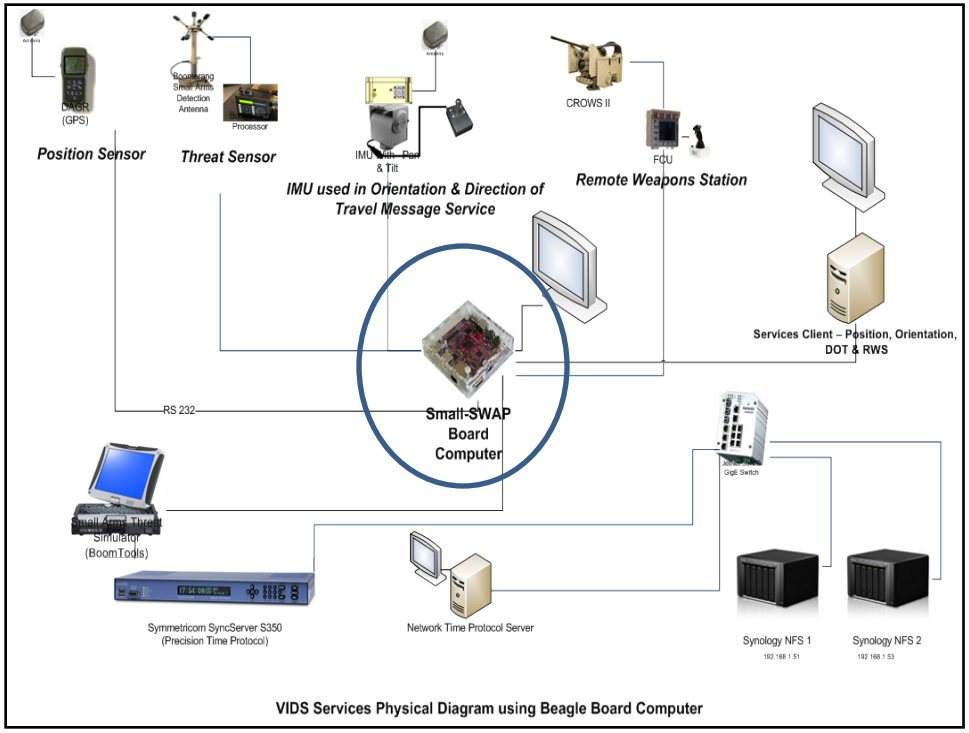


VICTORY Services Implemented on Small-SWAP Board

Small-SWAP Testing

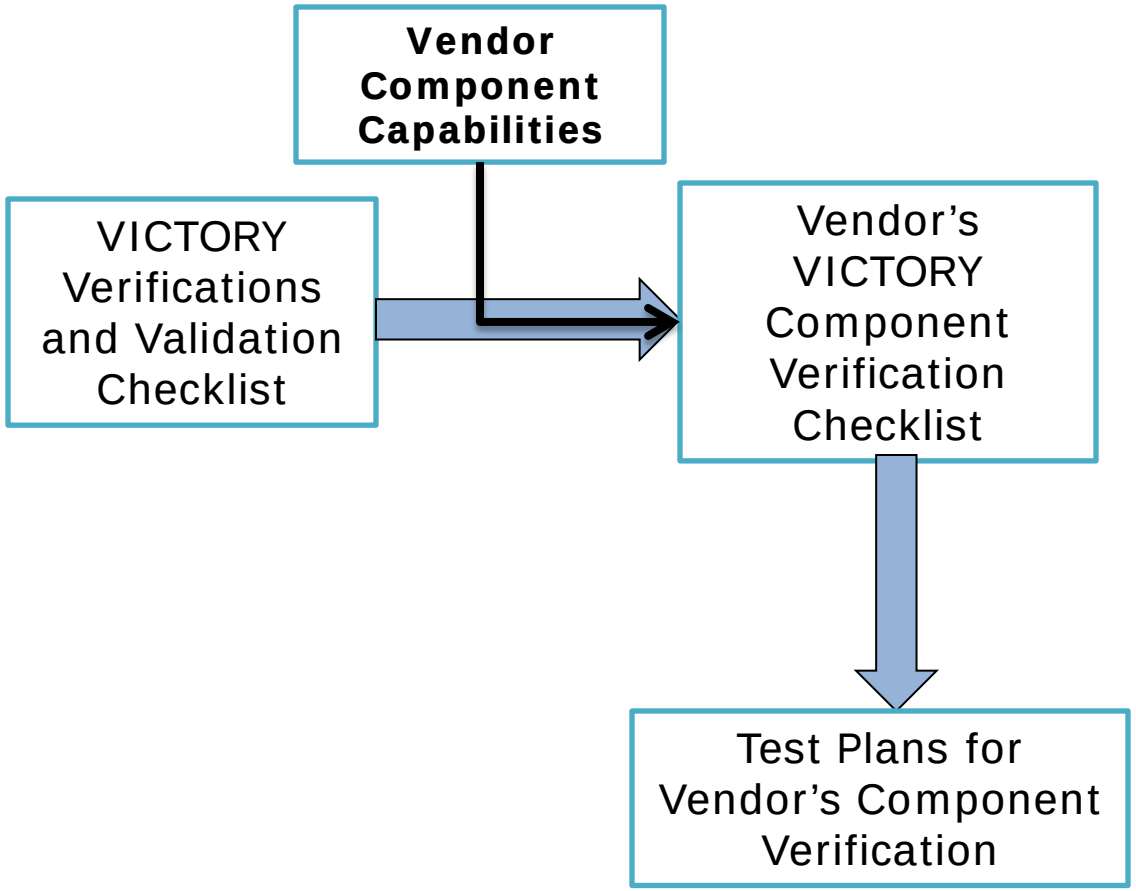
- **The Small-SWAP Board inserted into the network that included sensors that provided raw data for Position, Orientation, Timing, Threat and Remote Weapons Station.**
- **The results were very encouraging with very low power consumption (3.15 Watts), less than 1% system memory and CPU utilization and very low heat dissipation.**
- **Overall, developing and executing services on a Small-SWAP Board type computer on a vehicle platform with tight SWAP requirements is achievable with hardening the system to MIL standards.**





VIDS Services Physical Diagram using Beagle Board Computer

Verification of Vendor Components



Summary

- Built Capability for Open and Standardized Vehicle/EW Architecture.
- VICTORY 1.0 implementation is FMC by September, 2012
- Capability to test and verify vendor provided VICTORY capable components & subsystems
- Advancing SWAP-C with porting and testing 1.0 implementation to small, open and powerful process modules